REMARKS

The Examiner noted that claims 1-13 were pending in the application and rejected all the claims under 35 U.S.C. § 103(a). In rejecting the claims, U.S. Patents, 4,462,046 to Spight; 5,745,387 to Corby, Jr. et al. (References A and B in the January 25, 2005 Office Action); 4,611,292 to Ninomiya et al.; and 4,504,970 to Werth et al. (References B and C in the December 30, 2002 Office Action) were cited. Claims 1-13 remain in the case. The Examiner's rejections are traversed below.

Newly Cited Prior Art:

U.S. Patent 4,462,046 to Spight

The Spight patent is directed to a machine vision system utilizing programmable optical parallel processing. In the embodiment illustrated in Fig. 2, an object (ob) on table 50 is viewed by a plurality of "incoherent optical to electrical converters" which, in the preferred embodiment described at column 6, lines 29-35, are video cameras. One output of the cameras 52 is selected by multiplexing interface 54 for comparison with a reference image 13 to determine whether there is a match. If no match is found using the image from the first camera that is selected, the images from other cameras are selected one at a time "by controlling the signals received from the ... [cameras] by the multiplexing interface 54" (column 10, lines 3-5) to try to find a match (see column 7, lines 50-63). If no match is found, a different reference image is used and the process of selecting images is repeated (see column 8, lines 1-10). In the alternative embodiment described at column 9, lines 1-16, instead of multiple views of the object to be identified, multiple views of the reference object are used. Once a match is found, an object has been identified and its position determined, robot effector 202 can be driven to perform operations on or using the object (see column 8, lines 16-19).

U.S. Patent 5,745,387 to Corby, Jr. et al.

The Corby, Jr. et al. patent is directed an augmented reality maintenance system employing a manipulator arm 10 with a series of arm links 12 and joints 14 as illustrated in Fig. 1. At the distal end 10b of manipulator arm 10, utility package 11 may include a spatial imaging device, such as a video camera, an ultrasound device, a microphone, accelerometer, a welding drill or other repair device, etc. A position and attitude sensing unit 21 determines the position and orientation of each of the links 12 of manipulator arm 10 and determines the ultimate

position and orientation of distal end 10b. Manipulator arm renderer 33 creates an image of a prestored model of the manipulator arm 10 from model storage 47 for viewing on monitor 43 by operator 2. Environment renderer 35 produces images of the environment corresponding to viewpoints supplied by viewpoint unit 31b and offset computation device 31a "showing the environment viewed from the same viewpoint supplied to manipulator arm renderer 33, and ... as seen from the viewpoint of utility package 11 at distal end 10b of manipulator arm 10" (column 4, lines 61-65). Matching viewpoints are superimposed by video mixer 41 on monitor 43 and multiple viewpoints may be displayed simultaneously in sub-images. In one embodiment, the information obtained is stored in an archive and comparison device 50, so that movement of the arm in the past, together with information obtained by utility package 11, can be displayed at a later time (see column 6, lines 29-51). The described purpose of the archive and comparison device 50 is "to collect, retrieve and compare image data ... to determine the degree of deterioration" (column 6, lines 10-11 and 15-16) using "information from past inspections at a given site" (column 6, line 23). As described at column 7, lines 1-10, the video information may be displayed side-by-side, superimposed, or by employing appropriate image processing to highlight regions for special attention by operator control of signal processing unit and visualization (SP&V) unit 55.

Rejections under 35 USC § 103

In the Office Action, at pages 4-5, claims 1, 3, 4, and 8 were rejected under 35 U.S.C. § 103 as being unpatentable over Spight in view of Corby, Jr. et al. In paragraph 5 spanning pages 2 and 3 of the Office Action, it was acknowledged that Spight "does not disclose that one of the reference object and said image pickup device is ... movable and positionable ... to a plurality of different image pickup positions and directions, or that direction information ... is stored with the image data as a teaching model" (Office Action, page 3, lines 8-12). However, it was asserted that the teaching in Corby, Jr. et al. of an archive and comparison device would make it obvious to one of ordinary skill in the art to modify Spight to include the missing features.

As described above, neither Spight nor Corby, Jr. et al. teach or suggest that "one of the reference object and said pickup device is fixed to a movable and positionable part of a robot ... for positioning to a plurality of different image pickup positions and directions ... [that are] stored as a teaching model" (claim 1, last 6 lines). The alternative embodiment in Spight in which "a plurality of configurations of each desired object to be identified" (column 9, lines 6-7) are stored

for comparison with a single view of the object to be identified, contains no suggestion of how the plurality of configurations are obtained.

As to Corby, Jr. et al., there is no suggestion of storing a plurality of views for the purpose of **identifying** anything. As discussed above, the archive and comparison device is used for determining deterioration at a given inspection site. No description has been cited or found in Corby, Jr. et al. regarding how an operator determines what file should be used for comparison. Presumably the typical technique of using a naming convention for the files would be used, since other textual data can be input via text input device 57 (see column 6, lines 41-51). There is not the slightest suggestion that the site is identified "by carrying out pattern matching processing of an image" (claim 1, lines 5-6), either automatically, or by an operator. As a result, there is a lack of motivation from Corby, Jr. et al. to modify Spight to meet the limitations recited in claim 1.

For at least the reasons set forth above, it is submitted that claim 1 patentably distinguishes over Spight in view of Corby, Jr. et al. Since claims 3 and 4 depend from claim 1, it is submitted that claims 3 and 4 similarly distinguish over Spight in view of Corby, Jr. et al. for at least the reasons set forth above with respect to claim 1.

Claim 8 recites "determining a current three-dimensional orientation of a subject object relative to an image pickup device by carrying out pattern matching processing of an image of the subject based on a plurality of predetermined teaching models of a reference object" (claim 8, lines 3-5), where the teaching models are generated

> on the basis of respective image data produced by taking images of said reference object from a plurality of directions, wherein one of the reference object and said image pickup device is fixed to a movable and positionable part of a robot ..., and said robot is operated for positioning to a plurality of different image pickup positions and directions

(claim 8, last 7 lines). Therefore, it is submitted that claim 8 patentably distinguishes over Spight in view of Corby, Jr. et al. for the reasons set forth above with respect to claim 1.

With respect to claim 9, as discussed above with respect to claim 1, there is no suggestion in the combination of Spight and Corby, Jr. et al. of "using pattern matching to match one of the stored images with the current image" (claim 9, lines 10-11), where the stored images are generated by "images ... captured by a plurality of robotic operations corresponding to ... different relative orientations of the subject" (claim 9, lines 3-5) and the current image is "of a workpiece that has an unknown orientation relative to an image pickup device on the robot

before the robot has come into contact with the workpiece, where the workpiece has a shape substantially similar to the shape of the subject" (claim 9, lines 7-9). Therefore, it is submitted that claim 9 and claims 10 and 11 which depend therefrom patentably distinguish over Spight in view of Corby, Jr. et al. for at least the reasons set forth above with respect to claim 1.

Although the wording of claim 12 is not identical to claim 9, there are sufficient similarities that it is submitted that claim 12 patentably distinguishes over Spight in view of Corby, Jr. et al. for at least the reasons set forth above with respect to claims 1 and 9.

With respect to claim 13, as discussed above with respect to claim 1, there is no suggestion in the combination of Spight and Corby, Jr. et al. of "determining a current workpiece-camera orientation by matching one of the images or data thereof with the current image" (claim 13, lines 7-8), where "the images" are "robotically ...[taken] images of a subject with different three-dimensional subject-camera arrangements that vary in three dimensions" (claim 13, lines 2-3) and the "current image [is] of a workpiece shaped like the subject" (claim 13, line 5). Therefore, it is submitted that claim 10 patentably distinguishes over Spight in view of Corby, Jr. et al. for the reasons set forth above with respect to claim 1.

In items 14-18 on pages 6-8 of the Office Action, claims 2, 5 and 6 were rejected as unpatentable over Spight in view of Corby, Jr. et al. and further in view of Werth et al. and in items 19 and 20 on page 8 of the Office Action, claim 7 was rejected as unpatentable over Spight in view of Corby, Jr. et al. and Werth et al. and further in view of Ninomiya et al. Nothing has been cited or found in Werth et al. or Ninomiya et al. suggesting modification of the combination of Spight and Corby, Jr. et al. to overcome the deficiencies discussed above. Therefore, it is submitted that claims 2 and 5-7 patentably distinguish over Spight in view of Corby, Jr. et al., Werth et al. and Ninomiya et al. for at least the reasons set forth above with respect to claim 1 from which they depend.

Summary

At least in view of the differences discussed above, it is submitted that the prior art rejections should be withdrawn. There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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